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Environmental Research Institute of Michigan  
Computer Processing of ERTS-1  
MSS Data From the "San Francisco"  
Frame (1003-18175)\*\*

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SUMMARY

IBM 7094 digital computer analysis of ERTS-1 data was initiated to identify important water, soil, and vegetation classes in an agricultural segment of the "San Francisco" frame (frame no. 1003-18175). Recognition of five vegetation, one water and three bare soil categories was accomplished using pattern recognition applied to spectral signature information obtained by the ERTS-1 multispectral scanner.

Raw MSS bulk data were carefully examined for misregistration between spectral channels and none was found. A further check to determine if there were atmosphere-caused variations in observed spectral radiance in the scene revealed that negligible effects were present for the data examined.

Supervised learning pattern recognition techniques were used, with training sets defined by reference to simulated color infrared (CIR) film. The five vegetative categories were defined to include obviously separable classes on the CIR simulation and some classes which were difficult to differentiate.

Probabilities of misclassification (PM) were computed between all pairs of signatures used for training the linear classification rule, and no PM was greater than 0.06; the average PM was slightly greater than 0.01.

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\*\* Discipline - Agriculture, Land Use

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A linear approximation to the maximum likelihood ratio decision rule was used to classify the data (Richardson and Crane, 1972). All four ERTS-1 MSS bands were used for classification. A color-coded recognition map was prepared.

Qualitative analysis of this recognition map reveals that:

1) Defined classes of vegetation were well mapped in the 375 sq. in. test area.

2) Bare soil dikes between supposed rice fields were recognized as supposed sparse vegetation. This is not unreasonable because the dikes are too small to be adequately resolved by the ERTS-1 MSS. What is registered is a combination of vegetation and bare soil (i.e. sparse vegetation).

Quantitative analysis and identification of vegetation categories mapped is proceeding. The present results are felt to give some indication of the number of vegetation classes discernable from ERTS-1 data.

#### Reference

1. Richardson, W., Crane, R. (1972), "Rapid Process of Multispectral Scanner Data Using Linear Techniques", Remote Sensing of Earth Resources, Vol. 1, Edited by F. Shahrokhi, The University of Tennessee Space Institute, Tullahoma, Tennessee 37388